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Renewable Energy Policies and Law in the EU

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1. Introduction

In 2007 the European Council[1] committed the European Union to fight climate change and improve energy security by reducing greenhouse gas emissions by 20% compared to 1990, increasing the share of renewable energies in the overall EU energy consumption by 20% and increase energy efficiency in the EU so as to achieve the objective of saving 20 % of the EU's energy consumption compared to projections for 2020. Renewable energy is crucial to any move towards a low carbon economy. It is also a key component of the EU energy strategy. The European industry leads global renewable energy technology development, employs 1.5 million people and by 2020 could employ a further 3 million[2]. The promotion of renewable energy also develops a diverse range of mostly indigenous energy resources[3]. In this paper we analyse the measures that were taken in view of achieving this political commitment and their implementation. We take also a look to the further future.

[1] COUNCIL OF THE EUROPEAN UNION, Brussels, 2 May 2007, 7224/1/07, Rev1, Concl 1. The European Council is an institution of the European Union. It comprises the heads of state or government of the EU member states, along with the President of the European Commission. Since the entry into force of the Lisbon Treaty in December 2009 its president is elected by the Members for a once-renewable term of two and a half years. The President of the European Council currently is Herman Van Rompuy, a former Belgian Prime Minister. The High Representative for Foreign Affairs, currently Catherine Ashton, takes part in its meetings.

[2] *EmployRES study*, *The impact of renewable energy policy on economic growth and employment in the European Union,* Karlsruhe, 27 April 2009 (http://ec.europa.eu/energy/renewables/studies/doc/renewables/2009_employ_res_report.pdf).

[3] EUROPEAN COMMISSION, Communication from the Commission to the European Parliament and the Council, *Renewable Energy: Progressing towards the 2020 target*, Brussels, 31 January 2011, COM (2011) 31 final, p. 2

2. Some figures to start with[4]

Before discussing the policy objectives and measures taken, it seems useful to look first to some key figures that illustrates the *status questionis.*

Primary production of renewable energy

The *primary production of renewable energy* within the EU-27 in 2009 was 148.4 million tonnes of oil equivalent (toe), an 18.3 % share of total primary energy production. The volume of renewable energy produced within the EU-27 increased overall by 60.2 % between 1999 and 2009, equivalent to an average increase of 4.8 % per annum. Among renewable energies, the most important source in the EU was biomass and waste, accounting for 67.7 % of primary renewables production in 2009 (see *Table 1*). Hydropower was the other main contributor to the renewable energy mix (19.0 % of the total). Although its level of production remains relatively low, there was a particularly rapid expansion in the output of wind energy, which accounted for 7.7 % of the EU's renewable energy produced in 2009. The largest producer of renewable energy within the EU in 2009 was Germany, with an 18.7 % share of the EU-27 total; France (13.2 %) and Sweden (10.7 %) were the only other Member States to record double-digit shares, although Italy's share (9.9 %) was only just below this level. There were considerable differences in the renewable energy mix across the Member States, which reflect to a large degree natural endowments and climatic conditions. For example, more than three quarters (77.3 %) of the renewable energy produced in Cyprus was from solar energy, while more than a third of the renewable energy in the relatively mountainous countries of Austria, Slovenia and Sweden was from hydropower (much higher shares were recorded in Norway, Switzerland and Croatia). Close to one third of the renewable energy production in Italy was from geothermal energy sources (where active volcanic processes still exist). The share of wind power was particularly high in Ireland (41.4 %) and also accounted for more than one fifth of renewable energy production in Spain (27.3 %) and Denmark (21.0 %). The output of renewable energy in Germany grew at an average rate of 13.1 % per annum between 1999 and 2009, as such its share of the EU-27 total rose by 9.9 percentage points from an 8.7 % share in 1999. There were also average growth rates in excess of 10 % per annum recorded for Belgium, Ireland and Slovakia.

Gross inland energy consumption

Renewable energy sources accounted for 9.0 % of the EU-27's *gross inland energy consumption* in 2009 (see *Figure 1*). Over one third of the energy consumed in Latvia and Sweden was derived from renewables in 2009, while in Austria more than a quarter of energy consumption was accounted for by renewables. The share of renewables in gross final energy consumption stood at 11.7 % in the EU-27 in 2009, more than half the target that has been set for 2020 (*infra*). Among the Member States, the highest share of renewables in gross final energy consumption in 2009 was recorded in Sweden (47.3 %),

[4] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Renewable_energy_statistics. The tables and figures referred too are in the appendix.

while Latvia, Finland and Austria each reported more than a quarter of their final energy consumption derived from renewables.

Electricity generated from renewable energy sources

The latest information available for 2009 (see *Figure 2*) shows that electricity generated from renewable energy sources contributed 18.2 % of the EU-27's gross electricity consumption. In Austria (66.8 %) and Sweden (56.4 %) more than half of all the electricity consumed was generated from renewable energy sources, largely as a result of hydropower and biomass. The growth in electricity generated from renewable energy sources during the period 1999 to 2009 (see *Figure 3*) largely reflects an expansion in two renewable energy sources; namely, wind turbines and biomass. Although hydropower remained the single largest source for renewable electricity generation in the EU in 2009, the amount of electricity generated was somewhat lower than a decade earlier (-2.4 %). In contrast, the volume of electricity generated from biomass more than trebled, while that from wind turbines increased more than nine-fold.

Transport

The average share of renewable energy sources across the EU-27 was 4.2 % in 2009, ranging from a high of 8.6 % in Slovakia, and 6.0 % or more in Sweden, Austria and France to less than 1 % in Bulgaria, Denmark, Estonia and Malta (see *Figure 4*).

3. The 20-20-20 Targets and the Climate-Energy Package

In March 2007 the EU's leaders endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. They committed Europe to transforming itself into a highly energy-efficient, low carbon economy. The current European Union Plan on Climate Change and Energy Policy consists of a range of measures adopted by the European Union to fight against climate change and review energy policies. The plan, that was launched in March 2007, was, after months of tough negotiations between the member states, agreed by the European Parliament and the Council in December 2008 and became law in June 2009. The core of the package comprises four pieces of complementary legislation:

(a) The revision and strengthening of the Emissions Trading System (ETS)[5], the EU's key tool for cutting emissions cost-effectively. A single EU-wide cap on emission allowances will apply from 2013 and will be cut annually, reducing the number of allowances available to businesses to 21% below the 2005 level in 2020. The free allocation of allowances will be progressively replaced by auctioning, and the sectors and gases covered by the system will be somewhat expanded.

[5] Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community, *OJ L* 140, 5 June 2009.

(b) An 'Effort Sharing Decision'[6] governing emissions from sectors not covered by the EU ETS, such as transport, housing, agriculture and waste. Under the Decision each Member State has agreed to a binding national emission limitation target for 2020 which reflects its relative wealth. The targets range from an emissions reduction of 20% by the richest Member States to an increase in emissions of 20% by the poorest. These national targets will cut the EU's overall emissions from the non-ETS sectors by 10% by 2020 compared with 2005 levels.

(c) Binding national targets for renewable energy which collectively will lift the average renewable share across the EU to 20% by 2020 (more than double the 2006 level of 9.2%). The national targets range from a renewables share of 10% in Malta to 49% in Sweden. The targets will contribute to decreasing the EU's dependence on imported energy and to reducing greenhouse gas emissions.

(d) A legal framework to promote the development and safe use of carbon capture and storage (CCS)[7]. CCS is considered to be a promising family of technologies that capture the carbon dioxide emitted by industrial processes and store it in underground geological formations where it cannot contribute to global warming. The EU therefore plans to set up a network of CCS demonstration plants by 2015 to test its viability, with the aim of commercial update of CCS by around 2020.

In this contribution we will limit ourselves to renewable energy policies[8]. The Directive 2009/28/EC *on renewable energy*[9] sets ambitious targets for all Member States[10], such that the EU as a whole will reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector. It also improves the legal framework for promoting renewable electricity, requires national action plans that establish pathways for the development of renewable energy sources

[6] Decision 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, *OJ* L 140, 5 June 2009.

[7] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006, *OJ* L 140, 5 June 2009.

[8] Some measures were also taken to achieve a 20 % improvement in energy efficiency by 2010, including Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings, Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of eco-design requirements for energy-using products and Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services.

[9] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, *OJ* L 140, 5 June 2009.

[10] Until 2008, the development of renewable energy was driven by a loose legislative framework, which set non-binding targets. The "Renewable Electricity" Directive 2001/77/EC and the "Biofuels" Directive 2003/30/EC set national indicative targets such that the EU would reach a share of renewable energy in electricity generation of 21% by 2010 and a share of renewable energy replacing petrol and diesel in transport of 5,75% also by 2010. Neither of these targets have been met, even though both sectors have experienced continued growth (F. ERMACORA, *Promotion of renewable energy at EU level. The legal framework, its implementation and perspectives*, Paper presented at the Avosetta Oslo Meeting, 31 March 2011, www.avosetta.org); EUROPEAN COMMISSION, Communication from the Commission to the European Parliament and the Council, Renewable Energy: Progressing towards the 2020 target, Brussels, 31 January 2011, COM (2011) 31 final, p. 3

including bioenergy, creates cooperation mechanisms to help achieve the targets cost effectively and establishes the sustainability criteria for biofuels. Directive 2009/28/EC amended also Directive 2001/77/EC *on the promotion of electricity from renewable energy sources*[11]. This Directive, that was repealed on 1 January 2012, followed up the 1997 White Paper on renewable energy sources which set a target of 12% of gross inland energy consumption from renewables for the EU-15 by 2010, of which electricity would represent 22.1%. With the 2004 enlargement, the EU's overall objective became 21%. The Directive concerned electricity produced from non-fossil renewable energy sources such as wind, solar, geothermal, wave, tidal, hydroelectric, biomass, landfill gas, sewage treatment gas and biogas energies. The Member States had to adopt and to publish, initially every five years, a report setting the indicative Member State targets for RES-E consumption for the following ten years and showing what measures are to be taken to meet those targets. The Member State targets had to take account of the reference values set out in the Annex to the Directive for Member States' indicative targets concerning the share of electricity produced from renewable energy sources in gross electricity consumption in 2010. They had also to be compatible with all the national commitments entered into as part of the commitments accepted by the EU under the Kyoto Protocol. Directive 2009/28/EC also amended Directive 2003/30/EC on *biofuels*[12]. The Directive, which has meanwhile also been repealed the 1 of January 2012, set a minimum percentage of biofuels to replace diesel or petrol for transport purposes in each Member State. It is a question of reducing conventional emissions of CO_2 (carbon dioxide), CO (carbon monoxide), NO_x (nitrogen oxides), VOC (volatile organic compounds) and other particles which are toxic for health and the environment.

[11] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market, *OJ* L 283, 27 October 2001; amended by Council Directive 2006/108/EC of 20 November 2006 adapting Directives 90/377/EEC and 2001/77/EC in the field of energy, by reason of the accession of Bulgaria and Romania, *OJ* L 363, 20 December 2006 and by Directive 2009/28/EC.

[12] Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport, *OJ L* 123, 17 May 2003.

4. The Renewable Energy Directive[13]

4.1. Main Features of Directive2009/28/EC

It is first off all important to note that the renewable energy target for 2020 was made *legally binding*: the Directive2009/28/EC distributes the respective burden among Member States by prescribing legally binding targets to be fulfilled at national level. Member States have a large room of manoeuvre on how to reach the target. The main pillars of the Directive are: (a) Setting of mandatory national targets which amount to an overall 20% share of renewables in gross final consumption ("burden sharing") – plus, as part of the general target, a 10% renewables-in-transport target; (b) Obligation for Member States to present National Renewable Energy Action Plans (NREAP) showing the path towards reaching the targets; (c) Streamlining and facilitation of administrative procedures, regulations, standard setting and codes; (d) Freedom to apply national support schemes; (e) Cooperation mechanisms among Member States and with third countries; (d) Establishing sustainability criteria for biofuels' and bioliquids' eligibility for public support and for counting towards the targets[14].

4.2. The Renewable Energy 2020 and Intermediary Targets

According to Art. 3 (1) of the Directive each Member State shall ensure that the share of energy from renewable sources, calculated in accordance with Articles 5 to 11[15], in gross final consumption of energy in 2020 is at least its *national overall target* for the share of energy from renewable sources in that year, as set out in Annex I of the Directive. Such mandatory national overall targets are consistent with a

[13] A Directive is a legislative act of the European Union which requires member states to achieve a particular result without dictating the means of achieving that result. It can be distinguished from regulations which are self-executing and do not require any implementing measures. Directives normally leave member states with a certain amount of leeway as to the exact rules to be adopted. The legal basis for the enactment of directives is Article 288 of the Treaty on the Functioning of the European Union (formerly Article 249 TEC). When adopted, directives give member states a timetable for the implementation of the intended outcome. If a member state fails to pass the required national legislation, or if the national legislation does not adequately comply with the requirements of the directive, the European Commission may initiate legal action against the member state in the Court of Justice of the EU. This may also happen when a member state has transposed a directive in theory but has failed to abide by its provisions in practice. Notwithstanding the fact that directives were not originally thought to be binding before they were implemented by member states, the Court of Justice of EU developed the doctrine of direct effect where unimplemented or badly implemented directives can actually have direct legal force.

[14] F. ERMACORA, *Promotion of renewable energy at EU level. The legal framework, its implementation and perspectives*, Paper presented at the Avosetta Oslo Meeting, 31 March 2011, www.avosetta.org

[15] Articles 5 to 11 of the Directive describes in very detail how these share shall be calculated, taking into account statistical transfers between Member States, the effects of joint projects between Member States, joint projects between Member States and third countries, the effects of such projects and joint support schemes. We will not go into these flexible mechanisms as they are in practice not relevant for China, as it is not a member state of the EU or, as, projects with third countries are concerned, the geographical distance with the EU excludes that this mechanism can be useful for China.

target of at least a 20 % share of energy from renewable sources in the EU's gross final consumption of energy in 2020. In order to achieve the targets laid down in this Article more easily, each Member State shall promote and encourage energy efficiency and energy saving. Furthermore, Member States shall introduce measures effectively designed to ensure that the share of energy from renewable sources equals or exceeds that shown in the indicative trajectory of Annex I of the Directive. Recital 15 of the Directive recalls that the starting point, the renewable energy potential and the energy mix of each Member State vary. It was therefore necessary to translate the EU 20 % target into individual targets for each Member State, with due regard to a fair and adequate allocation taking account of Member States' different starting points and potentials, including the existing level of energy from renewable sources and the energy mix. It was considered to be appropriate to do this by sharing the required total increase in the use of energy from renewable sources between Member States on the basis of an equal increase in each Member State's share weighted by their GDP, modulated to reflect their starting points, and by accounting in terms of gross final consumption of energy, with account being taken of Member States' past efforts with regard to the use of energy from renewable sources.

The ***mandatory national overall targets*** are the following[16]:

	Share 2005[17]	Mandatory Target 2020[18]
Belgium	2,2 %	13 %
Bulgaria	9,4 %	16 %
Czech Republic	6,1 %	13 %
Denmark	17,0 %	30 %
Germany	5,8 %	18 %
Estonia	18,0 %	25 %
Ireland	3,1 %	16 %
Greece	6,9 %	18 %
Spain	8,7 %	20 %
France	10,3 %	23 %
Italy	5,2 %	17 %
Cyprus	2,9 %	13 %
Latvia	32,6 %	40 %
Lithuania	15,0 %	23 %
Luxembourg	0,9 %	11 %
Hungary	4,3	13 %
Malta	0,0 %	10 %
Netherlands	2,4 %	14 %
Austria	23,3 %	34 %
Poland	7,2 %	15 %
Portugal	20,5 %	31 %

[16] Annex I, A of the Directive.
[17] Share of energy from renewable sources in gross final consumption of energy, 2005 (S_{2005}).
[18] Target for share of energy from renewable sources in gross final consumption of energy, 2020 (S_{2020})

Romania	17,8 %	24 %
Slovenia	16,0 %	25 %
Slovak Republic	6,7 %	14 %
Finland	28,5 %	38 %
Sweden	39,8 %	49 %
United Kingdom	1,3 %	15 %
EU 27	***8.5%***	***20 %***

The ***indicative trajectory*** shall consist of the following shares of energy from renewable sources: S_{2005} + 0,20 (S_{2020} – S_{2005}), as an average for the two-year period 2011 to 2012; S_{2005} + 0,30 (S_{2020} – S_{2005}), as an average for the two-year period 2013 to 2014; S_{2005} + 0,45 (S_{2020} – S_{2005}), as an average for the two-year period 2015 to 2016; and S_{2005} + 0,65 (S_{2020} – S_{2005}), as an average for the two-year period 2017 to 2018, where S_{2005} is the share for that Member State in 2005 as indicated in the table before and S_{2020} is the share for that Member State in 2020 as indicated in the table above[19]. In order to reach these targets Member States may, inter alia, apply the following measures: (a) support schemes; (b) measures of cooperation between different Member States and with third countries for achieving their national overall targets in accordance with Articles 5 to 11 of the Directive. Without prejudice to Articles 87 and 88 of the Treaty (the actual Articles 107 and 108 TFEU laying down the basic rules on state aid), Member States shall have the right to decide, in accordance with Articles 5 to 11 of the Directive, to which extent they support energy from renewable sources which is produced in a different Member State (Art. 3 (3) of the Directive).

Each Member State shall ensure that the **share of energy from renewable sources in all forms of transport** in 2020 is at least 10 %[20] of the final consumption of energy in transport in that Member State (Art. 3 (4) of the Directive).

[19] Annex I, B of the Directive.

[20] The following provisions shall apply: (a) for the calculation of the denominator, that is the total amount of energy consumed in transport, only petrol, diesel, biofuels consumed in road and rail transport, and electricity shall be taken into account; (b) for the calculation of the numerator, that is the amount of energy from renewable sources consumed in transport all types of energy from renewable sources consumed in all forms of transport shall be taken into account; (c) for the calculation of the contribution from electricity produced from renewable sources and consumed in all types of electric vehicles for the purpose of points (a) and (b), Member States may choose to use either the average share of electricity from renewable energy sources in the EU or the share of electricity from renewable energy sources in their own country as measured two years before the year in question. Furthermore, for the calculation of the electricity from renewable energy sources consumed by electric road vehicles, that consumption shall be considered to be 2,5 times the energy content of the input of electricity from renewable energy sources. By 31 December 2011, the European Commission shall present, if appropriate, a proposal permitting, subject to certain conditions, the whole amount of the electricity originating from renewable sources used to power all types of electric vehicles to be considered. By the same date the Commission shall also present, if appropriate, a proposal for a methodology for calculating the contribution of hydrogen originating from renewable sources in the total fuel mix (Art. 3 (4) of the Directive).

4.3. National renewable energy action plans

4.3.1.Legal obligations

The National renewable energy action plans (NREAPs) play a central role in the system of the Directive. Each Member State must adopt, on the basis of a template provided by the European Commission[21] a national renewable energy action plan. The national renewable energy action plans shall set out Member States' national targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020, taking into account the effects of other policy measures relating to energy efficiency on final consumption of energy, and adequate measures to be taken to achieve those national overall targets, including cooperation between local, regional and national authorities, planned statistical transfers or joint projects, national policies to develop existing biomass resources and mobilise new biomass resources for different uses, and the measures to be taken to fulfil the requirements of Articles 13 to 19 of the Directive. Member States were obliged to notify their national renewable energy action plans to the Commission by 30 June 2010[22]. A Member State whose share of energy from renewable sources fell below the indicative trajectory in the immediately preceding two-year period, shall submit an amended national renewable energy action plan to the Commission by 30 June of the following year, setting out adequate and proportionate measures to rejoin, within a reasonable timetable, the indicative trajectory[23]. The Commission shall evaluate the national renewable energy action plans, notably the adequacy of the measures envisaged by the Member State to respect the indicative trajectory. In response to a national renewable energy action plan or to an amended national renewable energy action plan, the Commission may issue a recommendation. The Commission shall send to the European Parliament the national renewable energy action plans and the forecast documents in the form as made public on the *transparency platform*[24] as well as any recommendation[25].

[21] Commission Decision 2009/548/EC of 30 June 2009 establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC of the European Parliament and of the Council, *Official Journal* L 182, 15 July 2009. The template takes into consideration the minimum requirements set out in Annex VI of the Directive.

[22] Each Member State was obliged to publish and notify to the European Commission, six months before its national renewable energy action plan was due, a forecast document indicating: (a) its estimated excess production of energy from renewable sources compared to the indicative trajectory which could be transferred to other Member States in accordance with Articles 6 to 11, as well as its estimated potential for joint projects, until 2020; and (b) its estimated demand for energy from renewable sources to be satisfied by means other than domestic production until 2020. That forecast shall be updated in the reports of the Member States as set out in Article 22(1)(l) and (m) of the Directive.

[23] The European Commission may, if the Member State has not met the indicative trajectory by a limited margin, and taking due account of the current and future measures taken by the Member State, adopt a decision to release the Member State from the obligation to submit an amended national renewable energy action plan.

[24] See Article 24 (2) of the Directive below.

[25] Art. 4 of the Directive.

4.3.2. Implementation by the Member States

4.3.2.1. Forecast documents

In accordance with Article 4(3) of the Directive all Member States have submitted documents giving their forecast of the expected use they will make of the cooperation mechanisms contained in the Directive. The cooperation mechanisms include "statistical transfers"[26] where Member State governments can agree to exchange statistically a given quantity renewable energy produced. Another mechanism is the "joint project"[27], where a specific new plant is identified and the output of the plant shared statistically between Member States. Joint projects concerning electricity production can also be established with third countries if a number of conditions are met, most importantly if the electricity is physically consumed in the EU, which seems to exclude in practice because of the distance a co-operation in this field between EU Member States and China. The intention behind the Directive's creation of these instruments is to allow Member States to achieve their targets in a cost effective manner, developing renewable energy sources wherever it is most efficient to do so.

The European Commission has made the national documents available to the public on its Transparency Platform, established in conformity with Article 24 of the Directive[28]. Key findings[29] from these reports are:

- At least ten Member States expect to have a surplus in 2020 compared to their binding target for the share of renewable energy in their final energy consumption. This surplus could be available to transfer to another Member State. The quantity is estimated at around 5.5 Mtoe, or around 2% of the total renewables needed in 2020. Spain and Germany forecast the largest surpluses in absolute terms, with 2.7 Mtoe and 1.4 Mtoe respectively.
- Five Member States expect to have a deficit in 2020 compared to their binding target for the share of renewable energy in their final energy consumption. These Member States thus require transfers from another Member State or third country, through the use of the Directive's cooperation mechanisms. The quantity amounts to around 2 Mtoe (<1% of the total renewable energy needed in 2020). Italy forecasts the largest deficit in absolute terms, of 1.2 Mtoe.
- The net result of Member States' forecasts for 2020 renewable energy consumption is that the EU should exceed its 20% target by over 0.3 percentage points.
- The comparatively small quantity of energy expected to be subject to the cooperation mechanisms reflects most Member States' ability to develop domestic resources cost effectively and their desire to

[26] Regulated in Art. 6 of the Directive.
[27] Regulated in Art. 7 of the Directive.
[28] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm
[29] European Commission, Summary of the Member State Forecast Documents: http://ec.europa.eu/energy/renewables/transparency_platform/doc/dir_2009_0028_article_4_3_forecast_by_ms_symmary.pdf

reap the economic social and environmental benefits of developing renewable energy sources nationally. However it remains the case that the cooperation mechanisms created by the Directive are available should Member States wish to make further use of them and achieve their targets even more cost effectively.

- A total of 13 Member States also expect to exceed the interim targets that result from the trajectory contained in the Directive and thus have a surplus in the years before 2020. Three Member States anticipate a deficit during this period. Thus Member States may also use the cooperation mechanisms to meet their trajectory in the years before 2020. The Directive requires indeed Member States to plan to meet or exceed their trajectory.
- Many Member States point out that these trajectories and targets require strong, new national energy efficiency and infrastructure measures.

A point worth noting as made by several Member States is that the development of their renewable energy sources, either to meet their targets or to take part in the use of cooperation mechanisms under the Directive, requires new infrastructure. This highlights that interconnector needs and the general need to reinforce the capacity of the grid in many countries of the Union is a necessary precursor, also for achieving the targets. For the EU overall, the share of electricity from renewable energy sources is expected to reach 33%- 35%, accentuating the need to improve the electricity grid's ability to manage and balance electricity flows and to improve the interconnections of the European grid to improve stability.

4.3.2.2. National renewable energy action plans

All Member States have notified their national renewable energy action plans to the European Commission by 30 June 2010[30]. Member States set in these plans out the sectoral targets, the technology mix they expect to use, the trajectory they will follow and the measures and reforms they will undertake to overcome the barriers to developing renewable energy. The European Commission has evaluated the plans, assessing their completeness and credibility. In addition, the Energy Research Centre of the Netherlands was contracted by the European Environment Agency to create an external database and summary report of the NREAPs.[31].

In its Communication to the European Parliament and the Council of 31 January 2011[32] the European Commission indicates that Member States projections show that renewable energy will grow at a faster pace in the years up to 2020 than in the past. Almost half of the Member States (Austria, Bulgaria, Czech Republic, Denmark, Germany, Greece, Spain, France, Lithuania, Malta, Netherlands, Slovenia and Sweden) are planning to exceed their own targets and be able to provide surpluses for other Member States. For two Member States (Italy and Luxembourg), a small part of the renewable energy needed to reach their target is planned to come from "imports" in the form of statistical transfers from Member

[30] http://ec.europa.eu/energy/renewables/action_plan_en.htm
[31] http://www.ecn.nl/units/ps/themes/renewable-energy/projects/nreap/;
[32] EUROPEAN COMMISSION, Communication from the Commission to the European Parliament and the Council, *Renewable Energy: Progressing towards the 2020 target*, Brussels, 31 January 2011, COM (2011) 31 final.

States with surpluses or third countries. *If all these production forecasts are fulfilled, the overall share of renewable energy in the EU will exceed the 20% target in 2020*. The plans also provide important information regarding *energy efficiency*. EU energy consumption in 2020 is projected to be 95% of the 2005 level. National energy consumption estimates range from increases (compared with 2005) of more than 20% in Cyprus, Lithuania and Malta to reductions of 14% in Germany and 9% in the UK. The Member States expect to more than double their total renewable energy consumption from 103 Mtoe in 2005 to 217 Mtoe in 2020 (gross final energy consumption). The electricity sector is expected to account for 45% of the increase, heating 37% and transport 18%. Following biomass, wind power will account for 27% projected increase in renewable energy consumption (two-thirds onshore, one-third offshore), which will generate demand for Europe's wind turbine manufacturers and associated support industries. Similarly, the solar energy industry will grow, notably for photovoltaics. Other technologies where quantities are currently small face even higher growth rates. Based on Member States' plans, renewable energy should constitute 37% of Europe's *electricity mix* by 2020. The projected expansion of electricity from renewable sources carries a number of implications. First, it highlights the need to accelerate the modernization of the electricity grid. Electricity systems have to become more interconnected and flexible, and new infrastructure development and reinforcement will be necessary, including the deployment of smart grid technologies. One of the greatest challenges regarding the grid infrastructure is to connect the offshore potentials, mainly wind, foreseen in the Northern Seas of Europe, developing the electricity network both off- and onshore. The Energy 2020 Strategy highlighted how the rise of electricity produced from renewable sources also has implications for the electricity market as a whole. Multiple, flexible, smaller scale distributed forms of electricity generation need different grid and market design rules compared to traditional large, centralized power sources. The market integration of renewable energy should ideally occur in a manner that ensures resources are developed where it makes most economic and environmental sense. Factors such as distance to consumption centres, implied grid needs and issues related to public acceptance and job creation clearly also play a role and cannot be ignored. In any event, support schemes should over time be adapted to apply best practice so as to avoid undue market distortions and excessive costs. As for the *heating and cooling sector*, biomass will remain the dominant technology, with 50% of the growth up to 2020 occurring in energy produced from this source (half of that in heating, a third in transport and the rest in electricity). In the past, there was only modest market development in the heating sector due to the lack of an adequate support framework in most Member States. However this will clearly change in the next years following the inclusion of the heating and cooling sector in the new EU renewable energy framework. Development and investments in Europe's biomass pellet industry, in biomass boiler technology, co-firing power plant technology and biofuels refining can be expected. The plans also indicate how Member States expect to meet their 10% renewable energy in *transport* target. First generation biofuels will be the predominant energy source over the period to 2020. Second generation biofuels and electric vehicles are expected to make only a small contribution by 2020.

At national level, consumers pay for green energy and infrastructure development through their electricity bills via national support schemes the most common of which are:

- Regulated prices: feed in tariffs, giving energy producers a fixed financial payment per unit of electricity or heat produced from renewable energy sources. Often fixed for 10-20 years, differentiated by technology and phased out.

- **Regulated premiums**: feed in premiums, giving energy producers a fixed financial payment per unit of electricity or heat produced from renewable energy sources for the green value; the producer receiving the market price for the physical energy.

- **Quota/certificates**: impose a minimum share or quota of renewables in the electricity, transport fuel or heating fuel mix, which can be met either through physical production (common for biofuels) or through purchasing "green certificates", virtual, rather than physical energy. The producer of the green energy is paid for the green certificates by the supplier or other facing the obligation.

- **Fiscal incentives**: tax exemptions or tax credits for investments in renewable energy projects.

- **Tenders**: A government call for tender for a renewable energy project, often specifying the capacity/production/technology/site. The winner is generally granted a long term power purchasing agreement at a competitive price.

Whilst there has been some convergence and improvement in the efficiency of some Member States' instruments in the electricity sector, there has not been any coordination. The continued existence of multiple different national support regimes shows little sign of change. This means investors and other market operators must deal with a wide range of changes, small and large, occasional or regular, in 27 Member States. This exacerbates the differences and distortions between Member States' electricity markets and ignores the benefits of operating in a single European electricity market. Given the growing importance of the share of renewable energy in the European electricity mix, this is a concern and shows the need for further reform of electricity market support schemes.[33]

4.4. Administrative procedures, regulations and codes

The lack of transparent rules and coordination between the different authorization bodies has, according to recital 41 of the Directive, been shown to hinder the deployment of energy from renewable sources. Therefore the specific structure of the renewable energy sector should be taken into account when national, regional and local authorities review their administrative procedures for giving permission to construct and operate plants and associated transmission and distribution network infrastructures for the production of electricity, heating and cooling or transport fuels from renewable energy sources. Administrative approval procedures should be streamlined with transparent timetables for installations using energy from renewable sources. Planning rules and guidelines should be adapted to take into consideration cost-effective and environmentally beneficial renewable heating and cooling and

[33] F. ERMACORA, l.c., 3

electricity equipment. For the benefit of rapid deployment of energy from renewable sources and in view of their overall high sustainable and environmental beneficial quality, Member States should, according recital 42 of the Directive, when applying administrative rules, planning structures and legislation which are designed for licensing installations with respect to pollution reduction and control for industrial plants, for combating air pollution and for the prevention or minimization of the discharge of dangerous substances in the environment, take into account the contribution of renewable energy sources towards meeting environmental and climate change objectives, in particular when compared to non-renewable energy installations. In order to stimulate the contribution by individual citizens to the objectives set out in the Directive, the relevant authorities should, according to recital 43, consider the possibility of replacing authorisations by simple notifications to the competent body when installing small decentralised devices for producing energy from renewable sources. The coherence between the objectives of the Directive and the EU's other environmental legislation should be ensured. In particular, during the assessment, planning or licensing procedures for renewable energy installations, Member States should take account of all EU environmental legislation and the contribution made by renewable energy sources towards meeting environmental and climate change objectives, in particular when compared to non-renewable energy installations.

Authorisation, certification and licensing procedures

In view of this objectives, article 13 of the Directive provides that Member States shall ensure that any national rules concerning the authorisation, certification and licensing procedures that are applied to plants and associated transmission and distribution network infrastructures for the production of electricity, heating or cooling from renewable energy sources, and to the process of transformation of biomass into biofuels or other energy products, are *proportionate* and *necessary*[34]. Member States shall,

[34] The ECJ held in relation to a principle national interdiction of the construction of wind power plants in Special Protection Areas under the Habitats Directive:

" 75 In this regard, the principle of proportionality referred to in Article 13 of Directive 2009/28, which is one of the general principles of European Union law, requires that measures adopted by Member States in this field do not exceed the limits of what is appropriate and necessary in order to attain the objectives legitimately pursued by the legislation in question; when there is a choice between several appropriate measures recourse must be had to the least onerous, and the disadvantages caused must not be disproportionate to the aims pursued (see, inter alia, Case C‑331/88 *Fedesa and Others* [1990] ECR I‑4023, paragraph 13, and Joined Cases C‑133/93, C‑300/93 and C‑362/93 *Crispoltoni and Others* [1994] ECR I‑4863, paragraph 41).

74 It is for the referring court to determine whether the national measure at issue is proportionate. That court must take account in particular of the fact that the legislation at issue in the main proceedings is confined to wind power plants and does not extend to other forms of renewable energy production, such as photovoltaic plants. Moreover, the prohibition applies solely to new wind turbines for commercial purposes, as wind power plants intended for self-consumption and having a capacity not exceeding 20 kW are excluded from the scope of that prohibition.

76 It follows from all of the foregoing that the Habitats and Birds Directives and Directives 2001/77 and 2009/28 must be interpreted as not precluding legislation which prohibits the location of wind turbines not intended for self-consumption on sites forming part of the Natura 2000 network, without any requirement for a prior assessment of the environmental impact of the project on the site specifically concerned, on condition that the principles of non‑discrimination and proportionality are respected." (ECJ, 21 July 2011, Case C‑2/10, *Azienda Agro-Zootecnica Franchini Sarl and Others*)

in particular, take the appropriate steps to ensure that: (a) subject to differences between Member States in their administrative structures and organization, the respective responsibilities of national, regional and local administrative bodies for authorization, certification and licensing procedures including spatial planning *are clearly coordinated and defined*, with *transparent timetables* for determining *planning and building applications*; (b) *comprehensive information* on the processing of authorization, certification and licensing applications for renewable energy installations and on available assistance to applicants *are made available at the appropriate level*; (c) administrative procedures are *streamlined* and *expedited* at the appropriate administrative level; (d) *rules* governing authorization, certification and licensing are *objective, transparent, proportionate, do not discriminate between applicants and take fully into account the particularities of individual renewable energy technologies*; (e) *administrative charges* paid by consumers, planners, architects, builders and equipment and system installers and suppliers are *transparent and cost-related*; and (f*) simplified and less burdensome authorisation procedures*, including through simple notification if allowed by the applicable regulatory framework, are established for *smaller projects* and for *decentralized devices* for producing energy from renewable sources, where appropriate[35].

Technical specifications for support schemes

Member States shall also clearly define any *technical specifications* which must be met by renewable energy equipment and systems in order to benefit from *support schemes*. Where European standards exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies, such technical specifications shall be expressed in terms of those standards. Such technical specifications shall not prescribe where the equipment and systems are to be certified and should not impede the operation of the internal market[36].

Equipment and systems in industrial or residential areas

Member States shall further *recommend to all actors*, in particular local and regional administrative bodies to ensure *equipment and systems are installed for the use of electricity, heating and cooling from renewable energy sources and for district heating* and *cooling* when planning, designing, building and renovating *industrial or residential areas*. Member States shall, in particular, encourage local and regional administrative bodies to include heating and cooling from renewable energy sources in the planning of city infrastructure, where appropriate[37]. Member States shall introduce in their *building regulations and codes* appropriate measures in order to increase the share of all kinds of energy from renewable sources in the building sector[38]. In establishing such measures or in their regional support schemes, Member States may take into account national measures relating to substantial increases in energy efficiency and relating to cogeneration and to passive, low or zero-energy buildings. By 31 December 2014, Member States shall, in their building regulations and codes or by other means with equivalent effect, where appropriate, require the use of minimum levels of energy from renewable

[35] Art. 13 (1) Directive.
[36] Art. 13 (2) Directive.
[37] Art. 13 (3) Directive.
[38] These shall apply to the armed forces, only to the extent that its application does not cause any conflict with the nature and primary aim of the activities of the armed forces and with the exception of material used exclusively for military purposes.

sources in new buildings and in existing buildings that are subject to major renovation. Member States shall permit those minimum levels to be fulfilled, inter alia, through district heating and cooling produced using a significant proportion of renewable energy sources[39].

Public buildings

Member States shall further ensure that new *public buildings*, and existing public buildings that are subject to major renovation, at national, regional and local level fulfil an exemplary role in the context of the Directive from 1 January 2012 onwards. Member States may, inter alia, allow that obligation to be fulfilled by complying with standards for zero energy housing, or by providing that the roofs of public or mixed private-public buildings are used by third parties for installations that produce energy from renewable sources[40].

Building regulations and codes

With respect to their building regulations and codes, Member States shall promote the use of *renewable energy heating and cooling systems and equipment that achieve a significant reduction of energy consumption*. Member States shall use energy or eco-labels or other appropriate certificates or standards developed at national or EU level, where these exist, as the basis for encouraging such systems and equipment. In the case of biomass, Member States shall promote conversion technologies that achieve a conversion efficiency of at least 85 % for residential and commercial applications and at least 70 % for industrial applications. In the case of heat pumps, Member States shall promote those that fulfil the minimum requirements of eco-labelling established in Commission Decision 2007/742/EC[41]. In the case of solar thermal energy, Member States shall promote certified equipment and systems based on European standards where these exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies. In assessing the conversion efficiency and input/output ratio of systems and equipment for the purposes of this paragraph, Member States shall use EU or, in their absence, international procedures if such procedures exist[42].

4.5. Access to and operation of the grids

Recital 57 of the Directive recognises that there is a need to support the integration of energy from renewable sources into the transmission and distribution grid and the use of energy storage systems for integrated intermittent production of energy from renewable sources. The development of renewable energy projects, including renewable energy projects of European interest under the Trans-European

[39] Art. 13 (4) Directive.
[40] Art. 13 (5) Directive.
[41] Commission Decision 2007/742/EC of 9 November 2007 establishing the ecological criteria for the award of the Community eco-label to electrically driven, gas driven or gas absorption heat pumps, *Official Journal* L 301, 20 November 2007.
[42] Art. 13 (6) Directive. The Directive contains also provisions dealing with information and training (art. 14); guarantees of origin of electricity, heating and cooling produced from renewable energy sources (art. 15)

Network for Energy (TEN-E) programme should be accelerated. To that end, the Commission should also analyse how the financing of such projects can be improved. Particular attention should be paid to renewable energy projects that will contribute to a significant increase in security of energy supply in the EU and neighbouring countries[43]. Interconnection among countries facilitates integration of electricity from renewable energy sources. Besides smoothing out variability, interconnection can reduce balancing costs, encourage true competition bringing about lower prices, and support the development of networks. Also, the sharing and optimal use of transmission capacity could help avoid excessive need for newly built capacity[44]. Priority access and guaranteed access for electricity from renewable energy sources are important for integrating renewable energy sources into the internal market in electricity. Requirements relating to the maintenance of the reliability and safety of the grid and to the dispatching may differ according to the characteristics of the national grid and its secure operation. Priority access to the grid provides an assurance given to connected generators of electricity from renewable energy sources that they will be able to sell and transmit the electricity from renewable energy sources in accordance with connection rules at all times, whenever the source becomes available. In the event that the electricity from renewable energy sources is integrated into the spot market, guaranteed access ensures that all electricity sold and supported obtains access to the grid, allowing the use of a maximum amount of electricity from renewable energy sources from installations connected to the grid. However, this does not imply any obligation on the part of Member States to support or introduce purchase obligations for energy from renewable sources. In other systems, a fixed price is defined for electricity from renewable energy sources, usually in combination with a purchase obligation for the system operator. In such a case, priority access has already been given[45].

In view of these objectives Article 16 of the Directive provides that Member States shall take the appropriate steps to *develop transmission and distribution grid infrastructure*, *intelligent networks*, *storage facilities* and *the electricity system*, in order to allow the secure operation of the electricity system as it accommodates the further development of electricity production from renewable energy sources, including interconnection between Member States and between Member States and third countries. Member States shall also take appropriate steps to *accelerate authorisation procedures* for grid infrastructure and to coordinate approval of grid infrastructure with administrative and planning procedures[46]. Subject to requirements relating to the maintenance of the reliability and safety of the grid, based on transparent and non-discriminatory criteria defined by the competent national authorities: (a) Member States shall ensure that transmission system operators and distribution system operators in their territory *guarantee the transmission and distribution of electricity produced from renewable energy sources*; (b) Member States shall also provide for either *priority access* or *guaranteed access* to the grid-system of electricity produced from renewable energy sources; (c) Member States shall ensure that when dispatching electricity generating installations, *transmission system operators* shall give *priority* to generating installations using renewable energy sources in so far as the secure operation of the national electricity system permits and based on transparent and non-discriminatory

[43] Recital 58 of the Directive.
[44] Recital 59 of the Directive.
[45] Recital 60 of the Directive.
[46] Art. 16 (1) Directive.

criteria. Member States shall ensure that appropriate grid and market-related operational measures are taken in order to minimise the curtailment of electricity produced from renewable energy sources. If significant measures are taken to curtail the renewable energy sources in order to guarantee the security of the national electricity system and security of energy supply, Members States shall ensure that the responsible system operators report to the competent regulatory authority on those measures and indicate which corrective measures they intend to take in order to prevent inappropriate curtailments[47].

Member States shall require transmission system operators and distribution system operators to set up and make public their *standard rules relating to the bearing and sharing of costs of technical adaptations*, such as grid connections and grid reinforcements, improved operation of the grid and rules on the non-discriminatory implementation of the grid codes, which are necessary in order to integrate new producers feeding electricity produced from renewable energy sources into the interconnected grid. Those rules shall be based on objective, transparent and non-discriminatory criteria taking particular account of all the costs and benefits associated with the connection of those producers to the grid and of the particular circumstances of producers located in peripheral regions and in regions of low population density. Those rules may provide for different types of connection[48]. Where appropriate, Member States may require transmission system operators and distribution system operators to bear, in full or in part, those costs Member States shall review and take the necessary measures to improve the frameworks and rules for the bearing and sharing of costs by 30 June 2011 and every two years thereafter to ensure the integration of new producers.[49] Member States shall require transmission system operators and distribution system operators to provide any new producer of energy from renewable sources wishing to be connected to the system with the comprehensive and necessary information required, including: (a) a comprehensive and detailed estimate of the costs associated with the connection; (b) a reasonable and precise timetable for receiving and processing the request for grid connection; (c) a reasonable indicative timetable for any proposed grid connection. Member States may allow producers of electricity from renewable energy sources wishing to be connected to the grid to issue a call for tender for the connection work.[50] The sharing of costs shall be enforced by a mechanism based on objective, transparent and non-discriminatory criteria taking into account the benefits which initially and subsequently connected producers as well as transmission system operators and distribution system operators derive from the connections[51]. Member States shall ensure that the charging of transmission and distribution tariffs does not discriminate against electricity from renewable energy sources, including in particular electricity from renewable energy sources produced in peripheral regions, such as island regions, and in regions of low population density. Member States shall ensure that the charging of transmission and distribution tariffs does not discriminate against gas from renewable energy sources.[52] Member States shall ensure that tariffs charged by transmission system operators and distribution

[47] Art. 16 (2) Directive.
[48] Art. 16 (3) Directive.
[49] Art. 16 (4) Directive.
[50] Art. 16 (5) Directive.
[51] Art. 16 (6) Directive.
[52] Art. 16 (7) Directive.

system operators for the transmission and distribution of electricity from plants using renewable energy sources reflect realisable cost benefits resulting from the plant's connection to the network. Such cost benefits could arise from the direct use of the low-voltage grid.[53] Where relevant, Member States shall assess the need to extend existing gas network infrastructure to facilitate the integration of gas from renewable energy sources.[54] Where relevant, Member States shall require transmission system operators and distribution system operators in their territory to publish technical rules in line with Article 6 of Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning the common rules for the internal market in natural gas, in particular regarding network connection rules that include gas quality, gas odoration and gas pressure requirements. Member States shall also require transmission and distribution system operators to publish the connection tariffs to connect renewable gas sources based on transparent and non-discriminatory criteria.[55] Member States in their national renewable energy action plans shall assess the necessity to build new infrastructure for district heating and cooling produced from renewable energy sources in order to achieve the 2020 national target referred to in Article 3(1). Subject to that assessment, Member States shall, where relevant, take steps with a view to developing a district heating infrastructure to accommodate the development of heating and cooling production from large biomass, solar and geothermal facilities.[56]

4.6. Sustainability criteria for biofuels and bioliquids

Biofuels and bioliquids, at least some applications, are controversial as their sustainability is concerned. Biofuel production should therefore, according recital 65 of the Directive be sustainable. The introduction and framing of sustainability criteria was one of the most debated issues around the Directive. Biofuels used for compliance with the targets laid down in the Directive, and those that benefit from national support schemes, should therefore be required to fulfil sustainability criteria. Irrespective of whether the raw materials were cultivated inside or outside the territory of the EU, energy from biofuels and bioliquids shall be taken into account for the following purposes if they fulfil the different sustainability criteria provided for by the Directive[57]: (a) measuring compliance with the requirements of the Directive concerning national targets; (b) measuring compliance with renewable energy obligations; (c) eligibility for financial support for the consumption of biofuels and bioliquids.[58]

[53] Art. 16 (8) Directive.
[54] Art. 16 (9) Directive.
[55] Art. 16 (10) Directive.
[56] Art. 16 (11) Directive.
[57] However, biofuels and bioliquids produced from waste and residues, other than agricultural, aquaculture, fisheries and forestry residues, need only to fulfill the sustainability criteria set out in Art. 17 (2) concerning greenhouse gas emission saving rates.
[58] Art. 17 (1) Directive.

The *greenhouse gas emission saving* from the use of biofuels and bioliquids shall be *at least 35 %*[59]; with effect from 1 January 2017 it shall be a*t least 50 %*; from 1 January 2018 it shall be *at least 60 %* for biofuels and bioliquids produced in installations in which production started on or after 1 January 2017.[60,61]

Biofuels and bioliquids:

- *shall not be made from raw material obtained from land with high biodiversity value*, namely land that had one of the following statuses in or after January 2008, whether or not the land continues to have that status: (a) primary forest and other wooded land, namely forest and other wooded land of native species, where there is no clearly visible indication of human activity and the ecological processes are not significantly disturbed; (b) areas designated: (i) by law or by the relevant competent authority for nature protection purposes; or (ii) for the protection of rare, threatened or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature, subject to their recognition in accordance with the second subparagraph of Article 18(4); unless evidence is provided that the production of that raw material did not interfere with those nature protection purposes; (c) highly bio-diverse grassland[62] that is: (i) natural, namely grassland that would remain grassland in the absence of human intervention and which maintains the natural species composition and ecological characteristics and processes; or (ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and which is species-rich and not degraded, unless evidence is provided that the harvesting of the raw material is necessary to preserve its grassland status; [63]

- *shall not be made from raw material obtained from land with high carbon stock*, namely land that had one of the following statuses in January 2008 and no longer has that status: (a) wetlands, namely land that is covered with or saturated by water permanently or for a significant part of the year; (b) continuously forested areas, namely land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30 %, or trees able to reach those thresholds in situ; (c) land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10 % and 30 %, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon

[59] In the case of biofuels and bioliquids produced by installations that were in operation on 23 January 2008, this obligation shall apply from 1 April 2013.
[60] The greenhouse gas emission saving from the use of biofuels and bioliquids shall be calculated in accordance with Article 19(1). Art. 19 (1) of the Directive, that refers to Annex V, contains a highly technically method of calculating these greenhouse gas emission savings.
[61] Art. 17 (2) Directive.
[62] The European Commission shall establish the criteria and geographic ranges to determine which grassland shall be covered by this point. Those measures, designed to amend non-essential elements of the Directive, by supplementing it shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 25(4).
[63] Art. 17 (3) Directive.

stock of the area before and after conversion is such that the conditions concerning greenhouse gas emission savings laid down in Art. 17 (2) would be fulfilled; [64, 65]

- *shall not be made from raw material obtained from land that was peatland in January 2008*, unless evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil.[66]

Agricultural raw materials cultivated in the EU and used for the production of biofuels and bioliquids shall furthermore be obtained in accordance with the requirements and standards under the provisions referred to under the heading "Environment" in part A and in point 9 of Annex II to Council Regulation (EC) No 73/2009 of 19 January 2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers and in accordance with the minimum requirements for good agricultural and environmental condition defined pursuant to Article 6(1) of that Regulation[67].

The Commission shall, every two years, starting in 2012, report to the European Parliament and the Council, in respect of both third countries and Member States that are a significant source of biofuels or of raw material for biofuels consumed within the EU, on national measures taken to respect the sustainability criteria and for soil, water and air protection. The Commission shall also report on the impact on social sustainability in the EU and in third countries of increased demand for biofuel, on the impact of EU biofuel policy on the availability of foodstuffs at affordable prices, in particular for people living in developing countries, and wider development issues. Reports shall address the respect of land-use rights. They shall state, both for third countries and Member States whether the country has ratified and implemented each of the relevant Conventions of the International Labour Organisation[68]. Those reports shall state, both for third countries and Member States that are a significant source of raw material for biofuel consumed within the EU, whether the country has ratified and implemented the relevant nature protection conventions[69]. The Commission shall, if appropriate, propose corrective action, in particular if evidence shows that biofuel production has a significant impact on food prices.[70]

[64] These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.
[65] Art. 17 (4) Directive
[66] Art. 17 (5) Directive.
[67] Art. 17 (6) Directive.
[68] - Convention concerning Forced or Compulsory Labour (No 29),
- Convention concerning Freedom of Association and Protection of the Right to Organise (No 87),
- Convention concerning the Application of the Principles of the Right to Organise and to Bargain Collectively (No 98),
- Convention concerning Equal Remuneration of Men and Women Workers for Work of Equal Value (No 100),
- Convention concerning the Abolition of Forced Labour (No 105),
- Convention concerning Discrimination in Respect of Employment and Occupation (No 111),
- Convention concerning Minimum Age for Admission to Employment (No 138),
- Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour (No 182).
[69] The Cartagena Protocol on Biosafety and the Convention on International Trade in Endangered Species of Wild Fauna and Flora.
[70] Art. 17 (7) Directive.

Member States shall not refuse to take into account, on other sustainability grounds, biofuels and bioliquids obtained in compliance with Article 17.[71]

The Commission shall report on requirements for a sustainability scheme for energy uses of biomass, other than biofuels and bioliquids, by 31 December 2009. That report shall be accompanied, where appropriate, by proposals for a sustainability scheme for other energy uses of biomass, to the European Parliament and the Council. That report and any proposals contained therein shall be based on the best available scientific evidence, taking into account new developments in innovative processes. If the analysis done for that purpose demonstrates that it would be appropriate to introduce amendments, in relation to forest biomass, in the calculation methodology in Annex V or in the sustainability criteria relating to carbon stocks applied to biofuels and bioliquids, the Commission shall, where appropriate, make proposals to the European Parliament and Council at the same time in this regard[72].

Article 18 contains the detailed rules to *verify compliance with these sustainability criteria*. Economic operators shall for that purpose use a mass balance system responding to the requirements set out in Art. 18 (1) . The EU shall endeavour to conclude *bilateral or multilateral agreements* with third countries containing provisions on sustainability criteria that correspond to those of this Directive. Where the EU has concluded agreements containing provisions relating to matters covered by the sustainability criteria the European Commission may decide that those agreements demonstrate that biofuels and bioliquids produced from raw materials cultivated in those countries comply with the sustainability criteria in question. When those agreements are concluded, due consideration shall be given to measures taken for the conservation of areas that provide, in critical situations, basic ecosystem services (such as watershed protection and erosion control), for soil, water and air protection, indirect land-use changes, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce and to the social sustainability issues.

The European Commission may decide that *voluntary national or international schemes setting standards for the production of biomass products* contain accurate data on greenhouse gas emission saving or demonstrate that consignments of biofuel comply with the sustainability criteria of the Directive. The Commission may decide that those schemes contain accurate data for the purposes of information on measures taken for the conservation of areas that provide, in critical situations, basic ecosystem services (such as watershed protection and erosion control), for soil, water and air protection, the restoration of degraded land, the avoidance of excessive water consumption in areas where water is scarce and on the social sustainability issues. The European Commission may also decide that voluntary national or international schemes to measure greenhouse gas emission saving contain accurate data on gas emission saving[73]. Different schemes have been recognised meanwhile by the European Commission[74].

[71] Art. 17 (8) Directive.
[72] Art. 17 (9) Directive.
[73] Art. 18 (4) Directive.
[74] Commission Implementing Decision 2011/436/EU of 19 July 2011 on the recognition of the '*Abengoa RED Bioenergy Sustainability Assurance*' scheme for demonstrating compliance with the sustainability criteria under

4.7. Specific provisions related to energy from renewable sources in transport

Member States shall ensure that information is given to the public on the availability and environmental benefits of all different renewable sources of energy for transport. When the percentages of biofuels, blended in mineral oil derivatives, exceed 10 % by volume, Member States shall require this to be indicated at the sales points. For the purposes of demonstrating compliance with national renewable energy obligations placed on operators and the target for the use of energy from renewable sources in all forms of transport, the contribution made by biofuels produced from wastes, residues, non-food cellulosic material, and ligno-cellulosic material shall be considered to be twice that made by other biofuels[75].

4.8. Reporting by the Member States

Each Member State shall submit a report to the European Commission on progress in the promotion and use of energy from renewable sources by 31 December 2011, and every two years thereafter. The sixth

Directives 2009/28/EC and 2009/30/EC of the European Parliament and of the Council, *OJ* L 190, 21 July 2011; Commission Implementing Decision 2011/437/EU of 19 July 2011 on the recognition of the '*Biomass Biofuels Sustainability voluntary scheme*' for demonstrating compliance with the sustainability criteria under Directives 2009/28/EC and 2009/30/EC of the European Parliament and of the Council, *OJ* L 190, 21 July 2011; Commission Implementing Decision 2011/438/EU of 19 July 2011 on the recognition of the '*International Sustainability and Carbon Certification*' scheme for demonstrating compliance with the sustainability criteria under Directives 2009/28/EC and 2009/30/EC of the European Parliament and of the Council, *OJ* L 190, 21 July 2011; Commission Implementing Decision 2011/439/EU of 19 July 2011 on the recognition of the '*Bonsucro EU*' scheme for demonstrating compliance with the sustainability criteria under Directives 2009/28/EC and 2009/30/EC of the European Parliament and of the Council, *OJ* L 190, 21 July 2011; Commission Implementing Decision 2011/440/EU of 19 July 2011 on the recognition of the '*Round Table on Responsible Soy EU RED*' scheme for demonstrating compliance with the sustainability criteria under Directives 2009/28/EC and 2009/30/EC of the European Parliament and of the Council, *OJ* L 190, 21 July 2011; Commission Implementing Decision 2011/441/EU of 19 July 2011 on the recognition of the '*Greenergy Brazilian Bioethanol verification programme*' scheme for demonstrating compliance with the sustainability criteria under Directives 2009/28/EC and 2009/30/EC of the European Parliament and of the Council, *OJ* L 190, 21 July 2011; Commission Implementing Decision 2012/210/EU of 23 April 2012 on recognition of the '*Ensus voluntary scheme under RED for Ensus bioethanol production*' for demonstrating compliance with the sustainability criteria under Directives 2009/28/EC and 98/70/EC of the European Parliament and of the Council, *OJ* L 110, 24 April 2012; Commission Implementing Decision 2012/395/EU of 16 July 2012 on recognition of the '*Red Tractor Farm Assurance Combinable Crops & Sugar Beet Scheme*' for demonstrating compliance with the sustainability criteria under Directives 98/70/EC and 2009/28/EC of the European Parliament and of the Council, *OJ* L 187, 17 July 2012.

[75] Art. 21 Directive.

report, to be submitted by 31 December 2021, shall be the last report required. In its first report, the Member State shall outline whether it intends to: (a) establish a single administrative body responsible for processing authorisation, certification and licensing applications for renewable energy installations and providing assistance to applicants; (b) provide for automatic approval of planning and permit applications for renewable energy installations where the authorising body has not responded within the set time limits; or (c) indicate geographical locations suitable for exploitation of energy from renewable sources in land-use planning and for the establishment of district heating and cooling. In each report the Member State may correct the data of the previous reports[76].

5. Beyond 2020….

In order to keep climate change below 2°C, the European Council reconfirmed in February 2011 the EU objective of reducing greenhouse gas emissions by 80-95% by 2050 compared to 1990, in the context of necessary reductions according to the Intergovernmental Panel on Climate Change by developed countries as a group[77]. There are many possible scenarios to achieve decarbonisation by 2050. In particular after the accident in the Nuclear Power Plant of Fukushima a scenario to be assessed more closely is one where up to 80% if not 100% of the electricity consumed in Europe is generated from renewable energy sources. The Commission presented detailed analysis of this and other scenarios in December 2011 in the form of the so-called "Energy Roadmap 2050"[78]. One of the scenario's included in the roadmap is indeed the so called "*High Renewable energy sources (RES) Scenario*". In this scenario, strong support measures for RES are leading to a very high share of RES in gross final energy consumption (75% in 2050) and a share of RES in electricity consumption reaching 97%. However, the share of renewable energy (RES) rises substantially in all studied scenarios, achieving at least 55% in gross final energy consumption in 2050, up 45 percentage points from 2011's level at around 10%. The share of RES in electricity consumption reaches 64% in a High Energy Efficiency scenario and 97% in a High Renewables Scenario that includes significant electricity storage to accommodate varying RES supply even at times of low demand. The analysis of all scenarios shows that the biggest share of energy supply technologies in 2050 comes from renewables. Thus, the second major pre-requisite for a more sustainable and secure energy system is a higher share of renewable energy beyond 2020. In 2030, all the decarbonisation scenarios suggest growing shares of renewables of around 30% in gross final energy consumption*. The challenge for Europe is to enable market actors to drive down the costs of renewable energy through improved research, industrialisation of the supply chain and more efficient policies and support schemes.* This could require greater convergence in support schemes and greater responsibilities for system costs among producers, in addition to Transmission System Operators (TSO). *Renewables will*

[76] Art. 22 Directive.
[77] European Council, October 2009.
[78] EUROPEAN COMMISSION, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Energy Roadmap 2050*, COM (2011)885 final, Brussels , 15 December 2011.

move to the centre of the energy mix in Europe, from technology development to mass production and deployment, from small-scale to larger-scale, integrating local and more remote sources, from subsidised to competitive. This changing nature of renewables requires changes in policy parallel to their further development. Incentives in the future, with increasing shares of renewables, have to become more efficient, create economies of scale, lead to more market integration and as a consequence to a more European approach. This has to build on using the full potential of the existing legislation , on the common principles of cooperation among Member States and with neighbouring countries, and possible further measures. Many renewable technologies need further development to bring down costs. There is a need to invest in new renewable technologies, such as ocean energy and concentrated solar power and 2nd and 3rd generation biofuels. There is also a need to improve existing ones, such as by increasing the size of offshore wind turbines and blades to capture more wind and to improve photovoltaic panels to harvest more solar power. *Storage technologies remain critical*. Storage is currently often more expensive than additional transmission capacity, gas backup generation capacity, while conventional storage based on hydro is limited. Greater efficiencies in their use and competitive costs require improved infrastructure for integration across Europe. With sufficient interconnection capacity and a smarter grid, managing the variations of wind and solar power in some local areas can be provided also from renewables elsewhere in Europe. This could diminish the need for storage, backup capacity and baseload supply.

In the near future, *wind energy from the Northern Seas and the Atlantic sea basin* can supply substantial quantities of electricity with declining costs. By 2050 wind power provides more electricity than any other technology in the High Renewables scenario. In the medium term, the contribution of ocean energy can provide an important contribution to electricity supply. Similarly, wind and solar power from the Mediterranean countries could deliver substantial quantities of electricity. The opportunity to import electricity produced from renewable sources from neighbouring regions is already complemented by strategies to use the comparative advantage of Member States e.g. such as in Greece where large scale solar projects are being developed. The EU will continue encouraging and facilitating the development of renewable and low-emission sources of energy in the Southern Mediterranean and interconnections with European distribution networks. Further interconnection with Norway and Switzerland will also continue to be critical. Similarly, the EU will look at the potential of renewable sources provided by countries like Russia and Ukraine (notably biomass).

Renewable heating and cooling are vital to decarbonisation. A shift in energy consumption towards low carbon and locally produced energy sources (including heat pumps and storage heaters) and renewable energy (e.g. solar heating, geothermal, biogas, biomass), including through district heating systems, is needed.

Decarbonisation will require a large quantity of biomass for heat, electricity and transport. In transport, a mix of several alternative fuels will be needed to replace oil, with specific requirements of the different modes. Biofuels will probably be a main option for aviation, long-distance road transport, and rail where it cannot be electrified. Work to ensure sustainability (e.g. on indirect land use change) is ongoing. The market uptake of new bio energy which reduces demand for land necessary for food production and

which increases the net greenhouse gas savings (e.g. biofuels based on waste, algae, forest residues), should continue to be promoted.

As technologies mature, costs will decrease and financial support can be reduced. Trade among Member States and imports from outside the EU could reduce costs in the medium to long-run. The existing targets for renewable energy appear to be useful for giving predictability to investors while encouraging a European approach and market integration of renewables[79].

The Energy Roadmap 2050 was discussed on 15 June 2012 by the Council of the European Union[80]. On behalf of a nearly unanimous Council, the Presidency[81], welcomed the Commission Communication, of 15 December 2011, on the Energy Roadmap 2050 which provides, through its technology neutral approach and the diversity of its illustrative scenarios, useful perspectives on the various routes towards decarbonisation1 of the European energy system by 2050. The Energy Roadmap 2050 is considered as a guidance in the further process of developing a long-term stable policy framework towards a low carbon emission, sustainable, competitive, affordable, safe and secure energy system in 2050, through its identification of key options, under certain assumptions, to reduce uncertainty among investors, decision-makers and citizens.

On 6 June 2012, the European Commission presented a Communication on its renewable energy policy, outlining options for the period beyond 2020. It confirms the market integration of renewables and the need for their growth in the decades after 2020. The Communication also calls for a more coordinated European approach in the establishment and reform of support schemes and an increased use of renewable energy trading among Member States[82].

[79] Energy Roadmap 2050, p. 11-12.
[80] Council of the European Union (Transport, Telecommunications and Energy), Energy items, Luxembourg, 15 June 2012 (Do11135/12)
[81] Doc 11553/12.
[82] EUROPEAN COMMISSION, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Renewable Energy: a major player in the European energy market*, COM (2012) 271 final, Brussels, 6 June 2012.

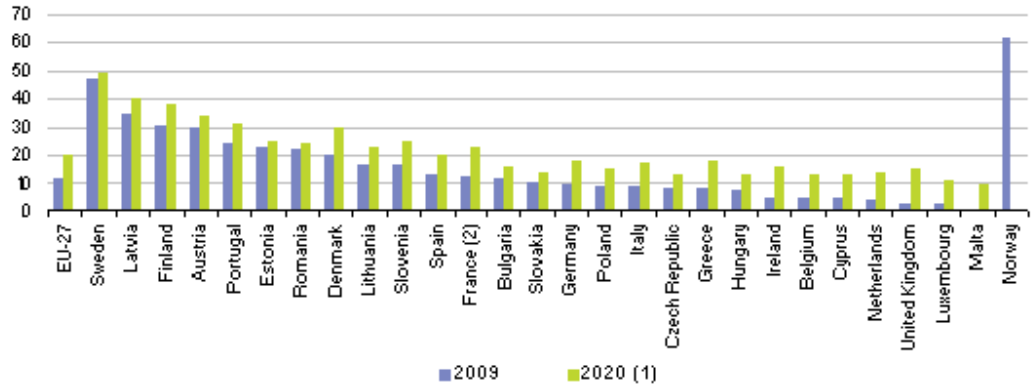
Appendix

Table 1. Primary production of renewable energy, 1999 and 2009

	Primary production (1 000 toe)		Share of total, 2009 (%)				
	1999	2009	Solar energy	Biomass & waste	Geothermal energy	Hydropower energy	Wind energy
EU-27	92 674	148 435	1.7	67.7	3.9	19.0	7.7
Euro area	62 261	104 794	2.2	64.4	5.4	18.7	9.2
Belgium	498	1 661	1.5	91.4	0.2	1.7	5.2
Bulgaria	665	1 129	-	68.9	2.9	26.4	1.8
Czech Republic	1 409	2 593	0.5	90.5	-	8.1	1.0
Denmark	1 619	2 754	0.5	78.0	0.4	0.1	21.0
Germany	8 069	27 692	3.5	77.0	1.7	5.8	12.0
Estonia	526	864	-	97.7	-	0.3	2.0
Ireland	222	614	0.7	45.3	-	12.7	41.4
Greece	1 419	1 804	10.4	51.2	1.2	25.1	12.1
Spain	6 031	11 905	5.7	47.9	0.1	19.0	27.3
France	16 528	19 567	0.3	70.2	0.6	25.1	3.5
Italy	9 401	14 746	1.0	34.0	32.6	28.7	3.8
Cyprus	44	75	77.3	21.3	-	-	-
Latvia	1 571	2 089	-	85.6	-	14.2	0.2
Lithuania	656	992	-	94.5	0.5	3.6	1.4
Luxembourg	35	80	2.5	80.0	-	11.3	6.3
Hungary	843	1 851	0.3	92.0	5.2	1.1	1.5
Malta	0	0	:	:	:	-	-
Netherlands	1 210	2 768	0.9	84.4	0.1	0.3	14.2
Austria	6 675	8 352	1.5	54.6	0.4	41.5	2.0
Poland	3 757	6 031	0.0	94.8	0.2	3.4	1.5
Portugal	3 342	4 747	1.1	66.4	3.7	15.0	13.7
Romania	4 400	5 275	-	74.2	0.5	25.3	0.0
Slovenia	551	863	-	53.1	-	46.9	-
Slovakia	458	1 223	-	68.5	0.7	30.7	0.1
Finland	7 256	7 833	0.0	85.8	-	13.9	0.3
Sweden	13 359	15 819	0.1	62.8	-	35.8	1.4
United Kingdom	2 133	5 107	1.4	74.1	0.0	8.9	15.7
Norway	11 872	12 116	-	9.7	-	89.6	0.7
Switzerland	4 693	4 760	0.9	30.1	4.4	64.5	0.0
Croatia	900	1 030	0.5	42.6	0.3	56.2	0.5
Turkey	10 701	9 909	4.3	46.8	16.4	31.2	1.3

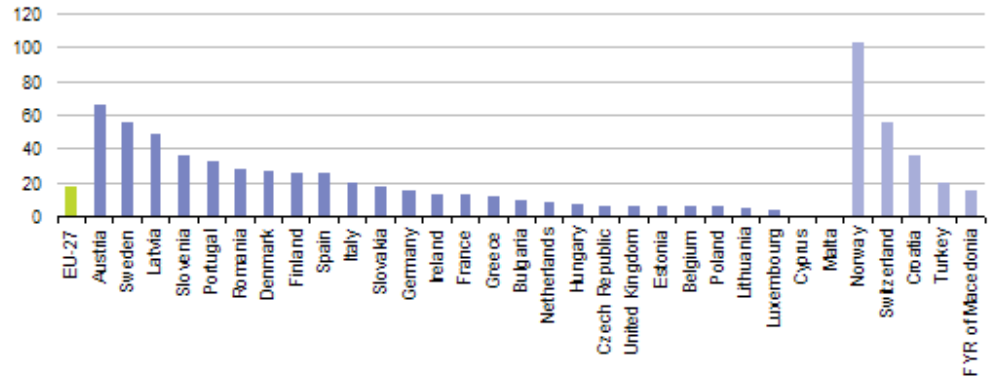
Source: Eurostat (online data codes: ten00081 and ten00082)

Figure 1: Share of renewables in gross final energy consumption in 2009 (%)



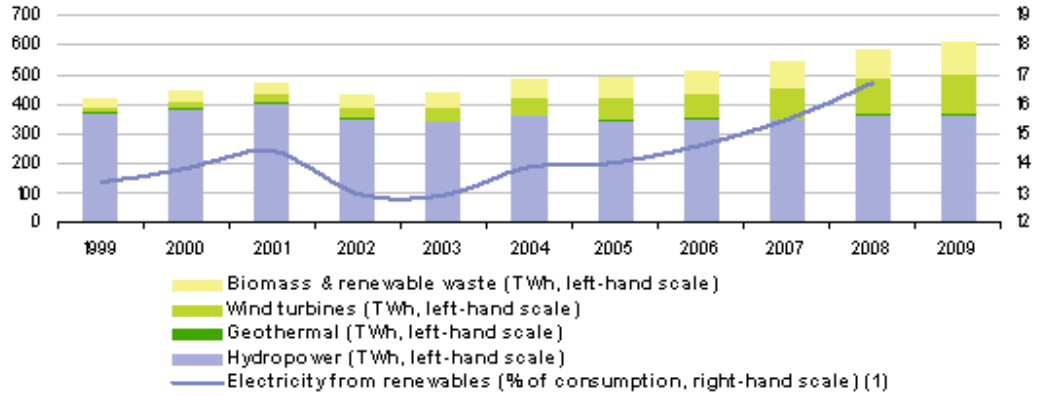
(1) Indicative targets for 2020; not available for Norway.
(2) Excluding French overseas departments and territories.
Source: Eurostat (online data code: t2020_31)

Figure 2: Proportion of electricity generated from renewable sources, 2009 (% of gross electricity consumption)



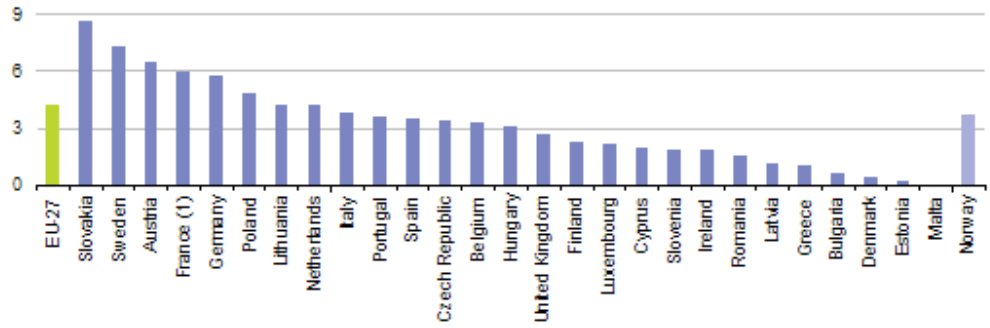
Source: Eurostat (online data code: tsien050)

Figure 3: Electricity generated from renewable energy sources, EU-27, 1999-2009



(1) 2009, not available.
Source: Eurostat (online data codes: nrg_105a and tsdcc330)

Figure 4: Share of renewable energy in fuel consumption of transport, 2009 (%)



(1) Excluding French overseas departments and territories.
Source: Eurostat (online data code: tsdcc340)